

- 21 -

C L A I M S

1. A process for the preparation of detergents, comprising separating the hydrocarbonaceous product stream from a Fischer-Tropsch process producing normally liquid and normally solid hydrocarbons into a light fraction comprising mainly C₂₀-hydrocarbons, preferably the light fraction comprising at least 90 %wt, more preferably at least 95 %wt, of C₂₀-hydrocarbons, and one or more heavy fractions comprising the remaining hydrocarbons, hydrogenation of at least part of the light fraction to convert unsaturated hydrocarbons and/or oxygenates into saturated hydrocarbons, distillation of product thus obtained into at least one fraction comprising detergent hydrocarbons, dehydrogenation of at least part of the detergent hydrocarbons to obtain a detergent hydrocarbon stream comprising mono-olefins and conversion of the mono-olefins into detergents.
2. A process for the preparation of detergents in which process a hydrogenated product, which product is obtained by separating the hydrocarbonaceous product stream from a Fischer-Tropsch process producing normally liquid and normally solid hydrocarbons into a light fraction comprising mainly C₂₀-hydrocarbons, preferably the light fraction comprising at least 90 %wt, more preferably at least 95 %wt, of C₂₀-hydrocarbons, and one or more heavy fractions comprising the remaining hydrocarbons, hydrogenation of at least part of the light fraction to convert unsaturated hydrocarbons and/or oxygenates into saturated hydrocarbons and distillation of product thus obtained into at least one fraction comprising detergent

- 22 -

hydrocarbons, is dehydrogenated to obtain a detergent hydrocarbon stream comprising mono-olefins, followed by conversion of the mono-olefins into detergents.

3. A process according to claim 1 or 2, in which the light fraction comprises mainly, preferably 90 %wt, more preferably 95 %wt, C₁₈-hydrocarbons, especially mainly, preferably 90 %wt, more preferably 95 %wt, C₁₆-hydrocarbons, more especially mainly, preferably 90 %wt, more preferably 95 %wt, C₁₄-hydrocarbons.

10 4. A process according to any of claims 1 to 3, in which the hydrocarbonaceous product stream of the Fischer-Tropsch process, before separation into the light fraction and the heavy fraction, is separated into a light stream, comprising most, suitably at least 80 %wt,

15 preferably 90 %wt, more preferably 95 %wt, of the C₁-C₄ hydrocarbons produced in the Fischer-Tropsch process, especially the light product stream comprising most, suitably at least 80 %wt, preferably 90 %wt, more

preferably 95 %wt, of the C₁-C₃ hydrocarbons produced in the Fischer-Tropsch process, and optionally unconverted synthesis gas constituents, carbon dioxide and other inert gasses, and a heavy stream which is separated into the light and the heavy fraction.

20 5. A process according to any of claims 1 to 4, in which process also a light product is removed from the hydrocarbonaceous product stream from the Fischer-Tropsch process or the light stream, the light product stream containing mainly the C₇-products, preferably the

25 C₈-products, more preferably the C₉-products, present in the stream, especially the light product comprising at least 90 %wt, more preferably at least 95 %wt, of the C₇-products present, more especially the light product

- 23 -

comprising at least 90 %wt, preferably at least 95 %wt, of the C₈-products present, still more especially the light product comprising at least 90 %wt, more preferably at least 95 %wt, of the C₉-products present.

- 5 6. A process according to any of claims 1 to 5, in which the light fraction which is to be hydrogenated comprises mainly C₉- to C₁₈-hydrocarbons, preferably at least 80 %wt C₉- to C₁₈-hydrocarbons, more preferably at least 90 %wt, especially the light fraction comprises mainly C₁₀- to C₁₃-hydrocarbons, preferably at least 80 %wt C₁₀- to C₁₃-hydrocarbons, more preferably at least 90 %wt, or the light fraction comprises mainly C₁₄- to C₁₇-hydrocarbons, preferably at least 80 %wt C₁₄- to C₁₇-hydrocarbons, more preferably at least 90 %wt, the 10 distillation of the hydrogenated hydrocarbons being an optional feature.
- 15 7. A process according to any of claims 1 to 6, in which the conversion of the mono-olefins into detergents comprises at least one step selected from:
- 20 - alkylation with benzene or toluene optionally followed by sulfonation and neutralisation;
- 25 - alkylation with phenol followed by at least one of alkoxylation, sulfonation and neutralisation, sulfation and neutralisation or alkoxylation combined with oxidation;
- 30 - hydroformylation optionally followed by at least one of alkoxylation, glycosylation, sulfation, phosphatation or combinations thereof
- sulfonation;
- epoxidation;
- hydrobromination followed by amination and oxidation to amine oxide; and

- 24 -

- phosphonation.

8. A process for the preparation of detergents and hydrocarbon fuels from the product stream of a Fischer-Tropsch process, comprising a process as described in any of claims 1 to 7 for the preparation of detergents from a light fraction of the Fischer-Tropsch process in combination with the hydrocracking/hydroisomerisation of the one or more heavy fractions of the Fischer-Tropsch process.

10 9. A process for the preparation of detergent hydrocarbons comprising separating the hydrocarbonaceous product stream of a Fischer-Tropsch process producing normally liquid and normally solid hydrocarbons into a light fraction comprising mainly C₂₀-hydrocarbons, preferably C₁₈-, more preferably C₁₆-, still more preferably C₁₄-hydrocarbons, and one or more heavy fractions comprising the remaining hydrocarbons, hydrogenation of the light fraction to convert unsaturated hydrocarbons and/or oxygenates into saturated hydrocarbons, distillation of product thus obtained into at least one fraction comprising detergent hydrocarbons and optionally dehydrogenation of at least part of the detergent hydrocarbons to obtain a detergent hydrocarbon stream comprising mono-olefins.

15 20 25 10. A process according to claim 9, in which any one or more reject streams in the process for the preparation of detergent hydrocarbons are used as additional feedstreams in the process for the preparation of fuels.

30 11. A process for the preparation of detergent hydrocarbons and hydrocarbon fuels from the product stream of a Fischer-Tropsch process, comprising a process as described in claim 9 or 10 for the preparation of detergent hydrocarbons from a light fraction of the

- 25 -

Fischer-Tropsch process in combination with the hydrocracking/hydroisomerisation of the heavy product stream of the Fischer-Tropsch process.

12. A process for the preparation of detergents

5 comprising dehydrogenation of detergent hydrocarbons to obtain a detergent hydrocarbon stream comprising mono-olefins and conversion of the mono-olefins into detergents, the detergent hydrocarbons being prepared by separating the product stream of a Fischer-Tropsch
10 process into a light fraction comprising mainly C₂₀-hydrocarbons, preferably C₁₈-, more preferably C₁₆-, still more preferably C₁₄-hydrocarbons, and a heavy fraction comprising the remaining hydrocarbons, hydrogenation of the light fraction to convert
15 unsaturated hydrocarbons and/or oxygenates into saturated hydrocarbons, distillation of product thus obtained into at least one fraction comprising detergent hydrocarbons.